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(54) MULTI-MEDIA DISTRIBUTION AND MULTI-MEDIA PLAYER

MULTIMEDIA-VERTEILUNG UND MULTIMEDIA-SPIELER

DISTRIBUTION MULTIMEDIA ET LECTEUR MULTIMEDIA

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Description

The present invention relates to simultaneous transmission of several different information via a television channel in the manner of multi-media-distribution and the recording and reproduction of multi-media-documents.

So called multi-media-documents are electronic documents which consist of:

- text
- still pictures
- graphics
- digital sound
- digital video
- any combination of the above mentioned kinds of data.

It is already known to use picture-in-picture television receivers and video text for providing different information. But the number of different information which may be transmitted by a normal television channel is restricted by bandwidth of television signal.

It is also known a multi-media terminal apparatus which can simultaneously operate a plurality of peripheral equipments connected to other multi-media terminal apparatuses on a network, see EP-A-0 435 344. The multi-media terminal apparatus is connected to other multi-media terminal apparatuses via a transmission line having a plurality of channels.

Transmission of digital television signals via direct broadcast satellite system (DBS), based on digital compression techniques, is also under development. Such a system can transmit digitally compressed video and audio signals and, optionally, associated control/conditional access data by means of satellite transmission. A large number of transmission channels with a net data rate between 20 to 30 Mbit/sec are provided. To compress video and audio the MPEG I algorithm (motion picture expert group) is used.

Therefore it is the task of this invention to build up a system which enables the distribution, recording and playback of a multiple of multi-media documents with low costs.

This problem is solved as described in claims 1 and 7. More details are stated in the subclaims.

The invention is based on the idea of using a television channel or parts of the bandwidth of it to distribute simultaneously a multiple of multi-media documents, whereas for recording and playback purpose already known devices with additional functionality are used.

The method is that several multi-media documents are read into a digital storage device like Compact Disc or in a digital video tape. These digital storage devices serve as a source of digital signals on the sending side. The digital signals are fed in several sub-channels into the multiplexer.

The number of possible subchannels and therefore

the number of multi-media documents simultaneously distributed is limited by:

- the number of available transmission channels
- the bandwidth of each channel
- and the bitrate for each subchannel.

For instance the following distribution schemes on one channel are possible: (Assumption channel capacity 23.6 Mbit/sec)

Example 1: 16 subchannels at the single Compact Disc (CD) data rate of around 1.4 Mbit/s.

Example 2: 3 tv programs subchannels at 6.8 Mbit/s each plus 2 subchannels with each single CD data rate.

Example 3: 2 tv program subchannels at 8 Mbit/s each plus 2 subchannels with double CD data rate plus 1 subchannel with single CD data rate.

To transmit several subchannels containing different multi-media documents the subchannels are time-multiplexed in the transmission channel. This has the following advantages:

- flexible usage of the overall channel capacity is possible
- otherwise unused remaining bandwidth within a channel can be used to transmit multi-media documents

In accordance with the present invention, there are provided on broadcasting studio side several sub-channels with average bit rates ranging from several kilobits/s up to the whole channel capacity, which are fed into a multiplexer. In the multiplexer the sub-channels are time-multiplexed and a control information is added. Afterwards the data is preferably undergone a channel coding to assure error-free transmission. The final step at the sending side is the modulation into an analogous signal and the emission via the different media, e.g. satellite, cable network or terrestrial distribution.

On the receiving side the signal passes the demodulation, error check and concealment and the demultiplexer after reception via satellite, cable network or terrestrial distribution. The demodulator treats only one out of several channels simultaneously. The task of the demultiplexer is to separate the different subchannels in one transmission channel and to extract the control information from the data stream.

Two classes of storing devices are possible:

a) A device which records the whole data stream of one channel - this is a digital VCR. The selection between the different subchannels is done at playback time by using the control information included in the bit stream according to the selection of the user.

b) A device which selects and records only one subchannel out of the n subchannels in one transmission channel - this is a disk-based device and called compact disc multi media player.

By monitoring the control information provided with the transmission the transmission channel decoder causes the compact disc multi-media player to record the distributed documents according to the programming of the user.

The transmission channel decoder can be housed in an external box or can be an integrated part of the compact disc multi-media player.

The distribution can be done during the night when free television transmission channels are available or at all times by means of separate channels.

The compact disc multi-media player is a superset of the known CD-I-Player with additional functions. These additional functions are the possibility to use CD-read-only and CD-writeable such as Magneto-Optical-Disc. Further additions are a remote channel interface which offers the possibility for remote storage of multi-media documents on the Magneto-Optical-Disc.

Optionally the compact disc multi-media player is equipped with a smart card reader for access permission or prohibition to the data in the different sub-channels.

A further option is the computer interface for the connection to a computer system.

There are two groups of application in which a compact disc multi-media player can be used.

The first group of applications relates to a first sub-group identical with CD-I-Applications: CD-Digital Audio, CD-Interactive, CD-Photo and CD-ROM and a second sub-group uses the recordable nature of the Magneto-Optical-Disc: CD erasable and the same format as CD, but erasable and recordable and CD for computer use: general purpose high-capacity storage media for personal or home computer.

The second group of applications can be called Electronic Press Applications. Such as there are Electronic Newspapers and Electronic Magazines, catalogues including product information with still pictures or even video sequences, educational software for correspondence course, remote downloading and updating of Point-of-sales and point-of-information stations and remote downloading and updating of databases. It is also based on the recordable nature of the Magneto-Optical-Disc and uses the mass-distribution of multi-media documents with the method described above.

The compact disc multi-media player will be used in the preferred environments:

CDMM and Television and Stereo Set
or
CDMM and Personal or Home Computer.

With almost the same cost as for a CD-I-only Player

the CD-Multi-Media Player opens the door to far more applications than what is known as CD-Interactive and becomes a Multi-Media platform for both professional and consumer applications.

5 More details of the invention will appear through the description of a non-limiting, preferred embodiment illustrated by the accompanying drawings.

In the drawings:

- 10 Figure 1 illustrates the distribution concept at the broadcasting studio side.
- Figure 2 illustrates the concept at the reception side with the two kinds of storing devices CD-MM-Player and digital VCR.
- 15 Figure 3 shows a block diagram of a CDMM-Player.
- Figure 4 illustrates a configuration CD-Interactive/Recordable.
- Figure 5 illustrates a configuration Remote Recording.
- 20 Figure 6 shows a block diagram of a digital VCR.

With the multi media system it is for example possible to transmit the content of 3 newspapers, 2 concerts (pure audio) and 2 films simultaneously. Therefore 25 these documents stored in digital form are required at the broadcast studio. For example the newspapers are stored on a computer hard disc, the concerts on digital audio tape and the films on digital video tape.

30 Embodiment CDMM-Player

According to Figure 1 on the broadcasting studio side there are provided several sub-channels SC1, SC2,.., SCn with either the single or double CD-data-rate which are fed into a multiplexer/coder MUXCC. The CD-data-rate is preferably but not limited to 1.41 Mbit/sec. The whole number of CD-data-rate channels is chosen in respect of the bandwidth of the transmission channel. In the multiplexer/coder MUXCC the sub-channels SC1, SC2,.., SCn are time-multiplexed and control information is added. On the whole, the commands and data of the control channel comprise a document identification, attention that a program will start in y seconds, start of the announced program, end of the program and 45 the encrypting. Certainly this description of the control data is not complete, but lists up the basic features of the control channel. Afterwards the data is undergone a forward error correction FEC to assure error-free transmission. The final step at the sending side is the 50 modulation by modulator MO into an analogous signal and the emission respectively transmission TR via the different media e.g. satellite S, cable network C or terrestrial T distribution.

At the receiving side, according to Fig. 2, the signal is fed after reception RE into the transmission channel decoder TCD. In the TCD the signal is demodulated, digitized and demultiplexed. Also a error check and concealment is possible. The control information is extract-

ed from the bit stream.

By monitoring the control information provided with the transmission TR the transmission channel decoder TCD causes the compact disc multi-media player CDMM to record the distributed documents according to the programming of the user. Since the compact disc multi-media player CDMM is in a stand-by mode it is necessary to wake it up. This is done by the transmission channel decoder TCD, when it has found a program identification x which matches with the user programming. The number y takes also into account the usage of juke-box-like multi disk players. In the control data there are also means provided to realize an access permission system by encrypting the data at the studio side and by decrypting it with a key on the receiving side.

The transmission channel decoder TCD can be housed in an external box or can be an integrated part of the compact disc multi-media player CDMM.

The distribution can happen during the night when free television transmission channels are available or in separate channels all around the clock.

The compact disc multi-media player CDMM is as shown in Fig.3 a superset of a known CD-I-Player with additional functions. These additional functions are the possibility to use CD-read-only and CD-writeable such as Magneto-Optical-Disc MOD. Further additions are the remote channel interface RCI which offers the possibility for remote storage of multi-media documents on the Magneto-Optical-Disc MOD.

Optionally the compact disc multi-media player CDMM is equipped with a smart card reader SMR for access permission or prohibition to the data in the different sub-channels SC1, SC2,...SCn.

A further option is the computer interface for the connection to a computer system.

As shown in Fig.4 and Fig.5 there are two groups of application in which a compact disc multi-media player CDMM can be used. The first group of applications relates to a first sub-group identical with CD-I-Applications: CD-Digital Audio, CD-Interactive, CD-Photo and CD-ROM and a second sub-group uses the recordable nature of the Magneto-Optical-Disc MOD: CD erasable and the same format as CD, but erasable and recordable and CD for computer use: general purpose high-capacity storage media for personal or home computer.

The second group of applications can be called Electronic Press Applications. Such e.g. are Electronic Newspapers and Electronic Magazines, catalogues including product information with still pictures or even video sequences, educational software for correspondence course, remote downloading and updating of downloading and updating of databases. It is also based on the recordable nature of the Magneto-Optical-Disc MOD and uses the mass-distribution of multi-media documents with the method described above.

Embodiment DVCR

The DVCR uses magnetic tape as storage media and therefore this device is able to store data at a data rate which corresponds to one sub-channel up to the data rate of the whole channel.

Fig.6 shows the block diagram of a DVCR. The building blocks are similar to that of the CDMM. The physical storage unit is a cassette tape drive.

10

Claims

1. Method for distribution of multi-media documents with multi-media terminal apparatuses which are connected to another multi-media terminal apparatus via a transmission line having a plurality of channels and with a plurality of processing units for controlling various multi-media processing operations characterized in that said multi-media documents in form of digital signals are fed into a multiplexer/coder (MUXCC) by several sub-channels (SC1, SC2,...SCn), said sub-channels are multiplexed in time, a control signal is added and this signal is modulated into an analogous transmission signal (TR) on the broadcasting studio side and at the receiving side the analogous transmission signal (TR) is treated up to the output of a tuner like a normal signal for television,
 - said signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a multi-media player (CDMM) to record a distributed document according to the programming of the user or
 - said signal is directly stored by a multi-media player (CDMM) and said stored signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a reproduction device for reproducing a distributed document according to the user's programming.
2. Method according to claim 1, wherein said several sub-channels (SC1, SC2,...SCn) with a single CD-data-rate are fed into a multiplexer/coder (MUXCC).
3. Method according to claim 1, wherein said several sub-channels (SC1, SC2,...SCn) with a CD-data-rate according to request of multi-media distribution

are fed into a multiplexer/coder (MUXCC).

4. Method according to any of the claims 1 to 3 characterized in that said multi-media player (CDMM) is used as a CD-I-Player and uses the record capacity of the Magneto-Optical-Disc (MOD). 5
5. Method according to any of the claims 1 to 3 characterized in that said multi-media player (CDMM) is used for Electronic Press Applications. 10
6. Method according to any of the claims 1 to 5 characterized in that said multi-media player (CDMM) is used in an environment of a television and radio set or in an environment of a personal or home computer. 15
7. Arrangement for distribution of multi-media documents with multi-media terminal apparatuses which are connected to another multi-media terminal apparatus via a transmission line having a plurality of channels and with a plurality of processing units for controlling various multi-media processing operations, characterized in that said arrangement comprises 20
 - a multiplexer/coder (MUXCC) to time multiplex sub-channels (SC1, SC2...SCn) and to add control information on the broadcasting studio side and said sub-channels (SC1, SC2...SCn) contain digital signals representing multi-media documents, 25
 - a modulator (MO) connected with the multiplexer/coder (MUXCC) to transform the signal of the multiplexer/coder (MUXCC) into an analogous transmission signal (TR) 30
 - a tuner (RE) coupled to a transmission channel decoder (TCD) for demodulation, digitizing, demultiplexing and extracting control information from the bit stream on the receiving side and 40
 - a multi-media player (CDMM) coupled to said decoder (TCD) for document recording and document reproducing according to the user's programming. 45
8. Arrangement according to claim 7 characterized in that said multi-media player (CDMM) comprises a CD-I-Player with the capability to use CD-read-only and CD-writeable and comprises a remote channel interface(RCI) which offers the possibility for remote storage of multi-media documents. 50
9. Arrangement according to claim 8 characterized in that said CD-I-Player with the possibility to use CD-writeable is a Magneto-Optical-Disc-Player. 55

10. Arrangement according to claim 7 characterized in that said multi-media player (CDMM) comprises a digital video cassette recorder (DVCR) for recording digital signals.

Patentansprüche

1. Verfahren zur Verteilung von Multimedia-Dokumenten mit Multimedia-Endgeräten, die mit anderen Multimedia-Endgeräten über eine Übertragungsstrecke mit einer Vielzahl von Kanälen verbunden sind, und mit einer Vielzahl von Verarbeitungseinheiten zum Steuern unterschiedlicher Multimedia-Verarbeitungsvorgänge, dadurch gekennzeichnet, daß die Multimedia-Dokumente in Form von digitalen Signalen über mehrere Unterkanäle (SC1, SC2...SCn) in einen Multiplexer/Koder (MUXCC) geführt werden, daß die Unterkanäle zeitmultiplex umgesetzt werden, daß ein Steuersignal hinzugefügt wird und dieses Signal auf der Rundfunkstudio-Seite in ein analoges Übertragungssignal (TR) moduliert wird, und daß auf der Empfangsseite das analoge Übertragungssignal (TR) bis zum Ausgang eines Tuners wie ein normales Fernsehsignal behandelt wird,
- das Signal demoduliert, digitalisiert, demultiplext und die Steuerinformation des Steuersignals aus dem Bitstrom extrahiert wird, so daß durch Auswerten des in der Übertragung enthaltenen Steuerinformationssignals ein Übertragungs-Kanaldekoder (TCD) bewirkt, daß ein Multimedia-Spieler (CDMM) ein verteiltes Dokument entsprechend der Programmierung durch den Benutzer aufzeichnet oder
- das Signal direkt von einem Multimedia-Spieler (CDMM) gespeichert wird und das gespeicherte Signal demoduliert, digitalisiert, demultiplext und die Steuerinformation des Steuersignals aus dem Bitstrom extrahiert wird, so daß durch Auswertung des in der Übertragung enthaltenen Steuerinformationssignals ein Übertragungs-Kanaldekoder (TCD) bewirkt, daß eine Wiedergabeinheit ein verteiltes Dokument entsprechend der Programmierung durch den Benutzer wiedergibt.
2. Verfahren nach Anspruch 1, worin mehrere Unterkanäle (SC1, SC2...SCn) mit der Datenrate einer einzigen CD in einen Multiplexer/Koder (MUXCC) geführt werden.
3. Verfahren nach Anspruch 1, worin mehrere Unterkanäle (SC1, SC2, ...SCn) mit einer CD-Datenrate entsprechend der Anforderung einer Multimedia-Verteilung in einen Multiplexer/Koder (MUXCC) geführt werden.

4. Verfahren nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß der Multimedia-Spieler (CDMM) als ein CD-I-Spieler benutzt wird und die Aufzeichnungskapazität der magnetooptischen Platte (MOD) benutzt. 5

zur Anwendung einer beschreibbaren CD ein Spieler mit einer magnetooptischen Platte ist.

5. Verfahren nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß der Multimedia-Spieler (CDMM) für elektronische Zeitschriften-Anwendungen verwendet wird. 10

10 **Revendications**

6. Verfahren nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der Multimedia-Spieler (CDMM) auf dem Gebiet der Fernseh- und Rundfunkgeräte oder auf dem Gebiet eines Personal- oder Heimcomputers angewendet wird. 15

1. Méthode pour la distribution de documents multimédia avec des terminaux multimédia qui sont connectés à un autre terminal multimédia par une ligne de transmission ayant une pluralité de canaux et avec une pluralité d'unités de traitement pour contrôler les diverses opérations de traitement multimédia, caractérisé en ce que les documents multimédia sous forme de signaux numériques sont alimentés dans un multiplexeur/encodeur (MUXCC) par plusieurs sous-canaux (SC1, SC2, ... SCn), lesdits sous-canaux sont multiplexés temporellement, un signal de commande est ajouté et ce signal est modulé en un signal de transmission analogique (TR) du côté du studio de diffusion et sur le côté réception, le signal de transmission analogique (TR) est traité à la sortie d'un syntoniseur comme un signal normal pour la télévision.

7. Anordnung zur Verteilung von Multimedia-Dokumenten mit Multimedia-Endgeräten, die mit anderen Multimedia-Endgeräten über eine Vielzahl von Kanälen enthaltende Übertragungsstrecke verbunden sind, und mit einer Vielzahl von Verarbeitungseinheiten zum Steuern unterschiedlicher Multimedia-Verarbeitungsvorgänge, dadurch gekennzeichnet, daß die Anordnung folgendes enthält: 20

- einen Multiplexer/Koder (MUXCC) zum Umsetzen der Unterkanäle (SC1, SC2...SCn) im Zeitmultiplex und zum Hinzufügen einer Steuerinformation auf der Rundfunk-Studiosseite, wobei die Unterkanäle (SC1, SC2...SCn) Multimedia-Dokumente darstellende digitale Signale enthalten, 25

- einen mit dem Multiplexer/Koder (MUXCC) verbundenen Modulator (MO) zum Umsetzen des Signals des Multiplexers/Koders (MUXCC) in ein analoges Übertragungssignal (TR),

- einen mit einem Übertragungskanal-Dekoder (TCD) verbundenen Tuner (RE) für die Demodulation, die Digitalisierung, das Demultiplexen und das Extrahieren der Steuerinformation aus dem Bitstrom auf der Empfangsseite und 30

- einen mit dem Dekoder (TCD) verbundenen Multimedia-Spieler (CDMM) zum Aufzeichnen und Wiedergeben der Dokumente entsprechend der Programmierung durch den Benutzer. 35

- ledit signal est démodulé, numérisé, démultiplexé et l'information de commande du signal de commande est extraite à partir du flot de bits de sorte que, en contrôlant le signal d'information de commande prévu avec la transmission, un décodeur du canal de transmission (TCD) amène un lecteur multimédia (CDMM) à enregistrer un document distribué selon la programmation de l'utilisateur ou

- ledit signal est directement stocké par un lecteur multimédia (CDMM) et ledit signal stocké est démodulé, numérisé, démultiplexé et l'information de commande du signal de commande est extraite à partir du flot de bits de sorte que, en contrôlant le signal d'information de commande prévu avec la transmission, un décodeur du canal de transmission (TCD) amène un dispositif de reproduction, à reproduire un document distribué selon la programmation de l'utilisateur.

8. Anordnung nach Anspruch 7, dadurch gekennzeichnet, daß der Multimedia-Spieler (CDMM) einen CD-I-Spieler mit der Möglichkeit zur Anwendung einer Nur-Lese-CD und einer beschreibbaren CD und eine Fernbedienkanal-Schnittstelle (RCI) enthält, die die Möglichkeit einer Fernspeicherung von Multimedia-Dokumenten bietet. 40

2. Procédé selon la revendication 1, dans lequel plusieurs sous-canaux (SC1, SC2, ... SCn) avec un débit de données de CD unique, sont alimentés dans un multiplexeur/encodeur (MUXCC).

9. Anordnung nach Anspruch 8, dadurch gekennzeichnet, daß der CD-I-Spieler mit der Möglichkeit 45

3. Procédé selon la revendication 1, dans lequel lesdits plusieurs sous-canaux (SC1, SC2, ... SCn) avec un débit de données CD selon la demande

d'une distribution multimédia, sont alimentés dans un multiplexeurlencodeur (MUXCC).

4. Procédé selon l'une quelconque des revendications 1 à 3, caractérisé en ce que ledit lecteur multimédia (CDMM) est utilisé comme lecteur CD-I et utilise la capacité d'enregistrement d'un disque magnéto-optique (MOD).

5. Méthode selon l'une quelconque des revendications 1 à 3, caractérisée en ce que ledit lecteur multimédia (CDMM) est utilisé pour des applications de presse électronique.

6. Méthode selon l'une quelconque des revendications 1 à 5, caractérisée en ce que ledit lecteur multimédia (CDMM) est utilisé dans un environnement de télévision et de radio ou dans un environnement d'ordinateurs personnel ou familial.

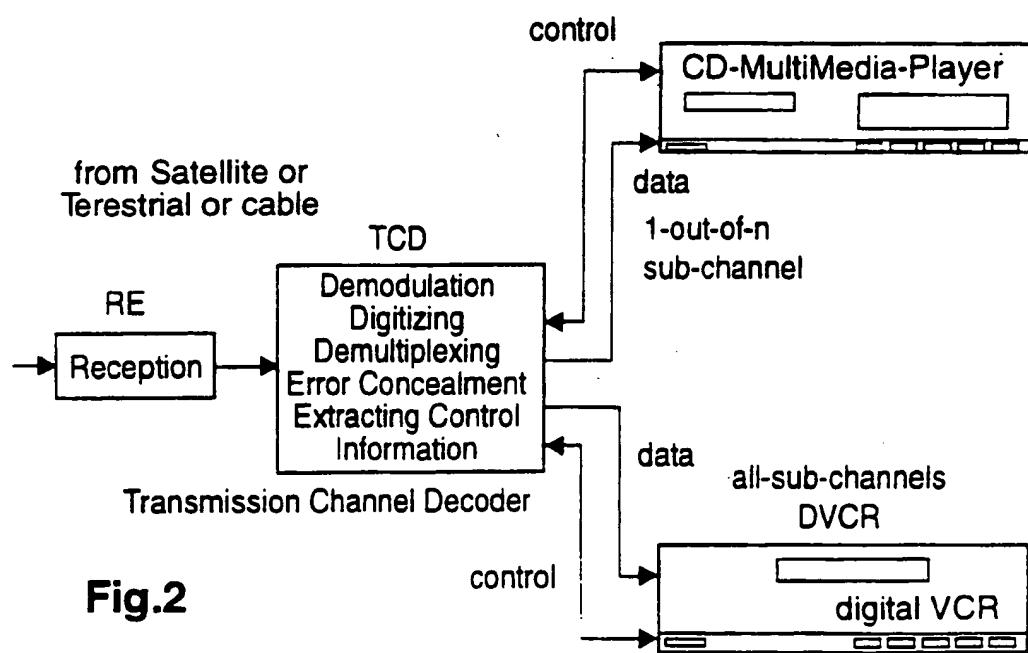
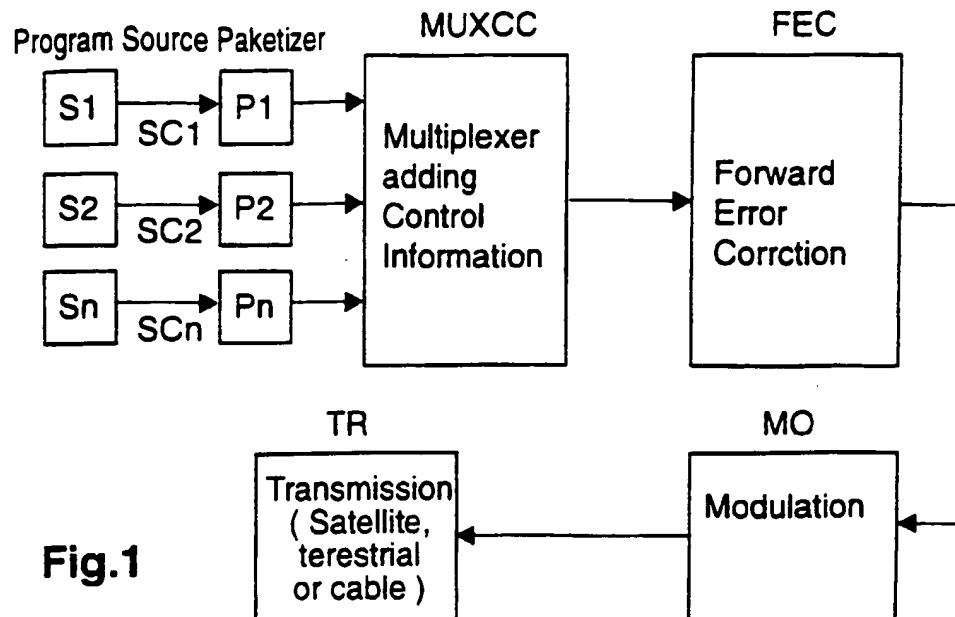
7. Disposition pour une distribution de documents multimédia avec des terminaux multimédia qui sont connectés à un autre terminal multimédia par une ligne de transmission comportant une pluralité de canaux et avec une pluralité d'unités de traitement pour contrôler diverses opérations de traitement multimédia, caractérisée en ce que ladite disposition comporte :

- un multiplexeurlencodeur (MUXCC) pour multiplexer temporellement des sous-canaux (SC1, SC2, ... SCn) et pour ajouter une information de commande du côté du studio de diffusion et lesdits sous-canaux (SC1, SC2, ... SCn) contiennent des signaux numériques représentant des documents multimédia,
- un modulateur (MD) connecté au multiplexeurlencodeur (MUXCC) pour transformer le signal du multiplexeurlencodeur (MUXCC) en un signal de transmission analogique (CR).
- un syntoniseur (RE) couplé à un décodeur de canal de transmission (TCD) pour une démodulation, numérisation, démultiplication et extraction d'informations de commande provenant du flot de bits sur le côté réception et,
- un lecteur multimédia (CDMM) couplé au dit décodeur (TCD) pour l'enregistrement d'un document et la reproduction d'un document selon la programmation de l'utilisateur.

8. Arrangement selon la revendication 7, caractérisé en ce que ledit lecteur multimédia (CDMM) comporte un lecteur CD-I avec la capacité d'utiliser un CD seulement lu et un CD réinscriptible et comporte une interface de canal télécommandée (RCI) qui offre la possibilité d'un stockage à distance de documents multimédia.

9. Arrangement selon la revendication 8, caractérisé en ce que ledit lecteur CD-I avec la possibilité d'utiliser un CD réinscriptible est un lecteur de disque magnéto-optique.

10. Arrangement selon la revendication 7, caractérisé en ce que ledit lecteur multimédia (CDMM) comporte un lecteur de cassettes vidéo numérique (DVCR) pour l'enregistrement de signaux numériques.



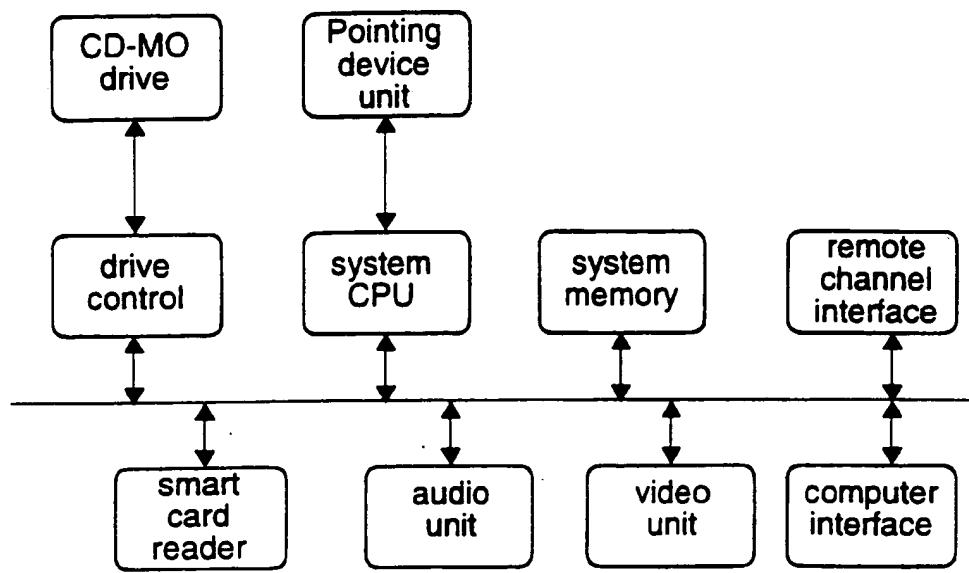


Fig.3

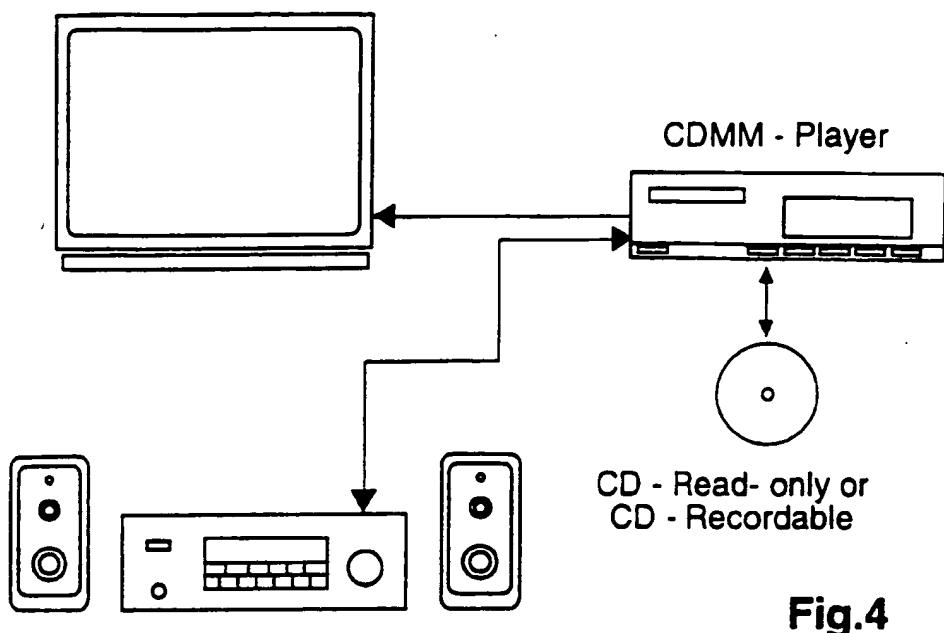


Fig.4

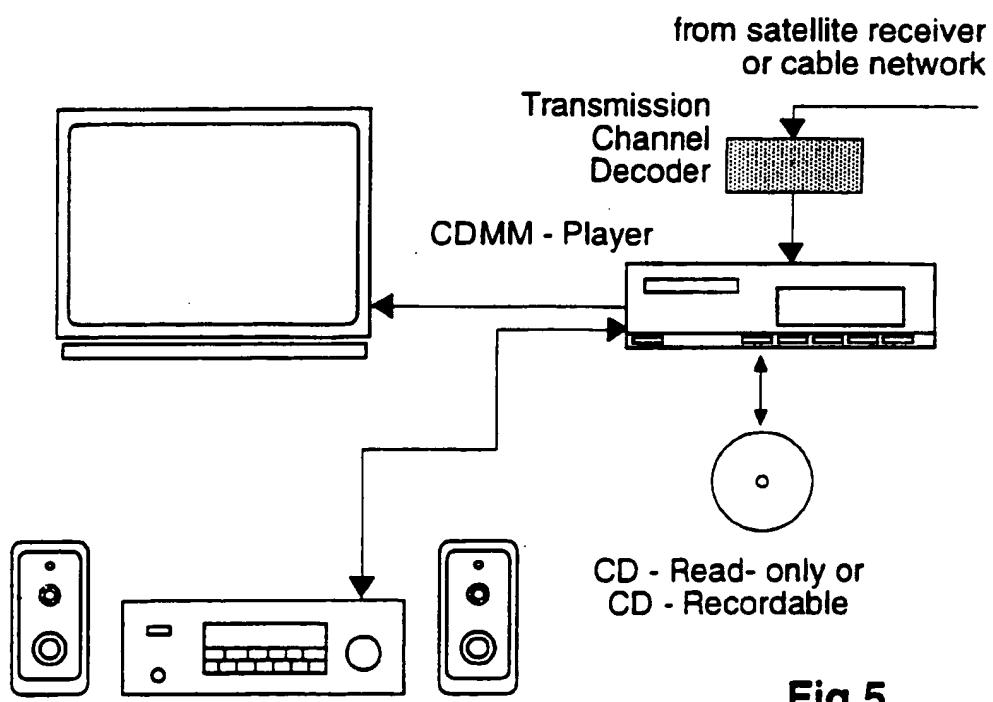


Fig.5

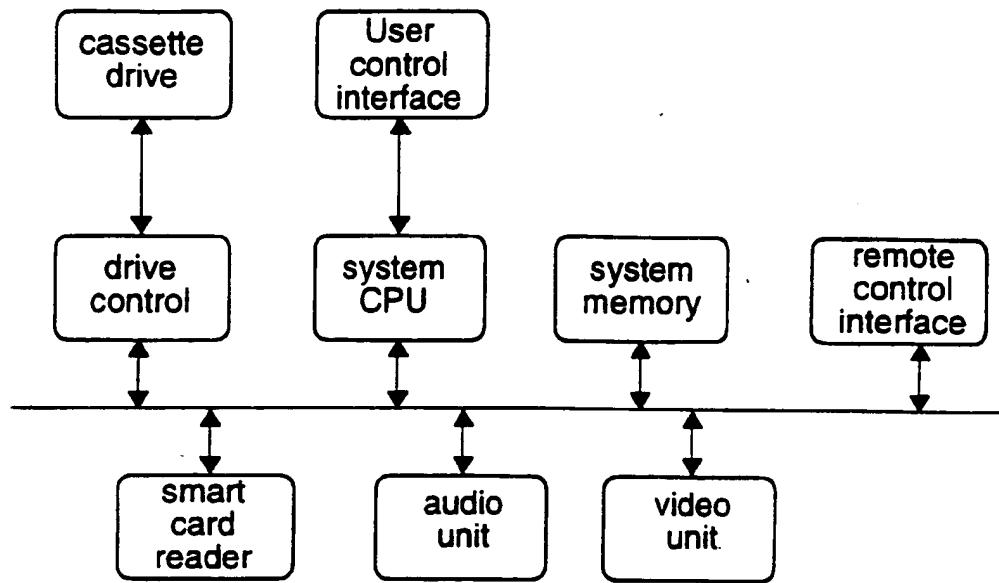


Fig.6